

What is claimed is:

- 1     1.     A radio frequency (RF) amplification system, comprising:  
2             a power amplifier having:  
3                 an output node to carry an RF output signal; and  
4                 a power node coupled to said output node through a component having a  
5             relatively high impedance at RF frequencies of said RF output signal;  
6             a switch circuit to controllably couple said power node to a first power source  
7     having a first potential; and  
8             a regulator circuit to prevent a negative envelope of said RF output signal on  
9     said output node from going substantially below a predetermined voltage level during  
10    operation of said RF amplification system by controllably coupling said power node to  
11    a second power source having a second potential in response to said negative envelope.
  
- 1     2.     The RF amplification system of claim 1, wherein:  
2             said second potential is greater than said first potential.
  
- 1     3.     The RF amplification system of claim 1, wherein:  
2             said predetermined voltage level is no less than a voltage level at which said  
3     power amplifier leaves a linear region of operation.
  
- 1     4.     The RF amplification system of claim 3, wherein:  
2             said power amplifier includes at least one insulated gate field effect transistor;  
3     and  
4             said linear region of operation includes a saturation region of operation.
  
- 1     5.     The RF amplification system of claim 1, wherein:  
2             said switch circuit decouples said power node from said first power source when  
3     a voltage on said power node increases a predetermined amount upon coupling said  
4     power node to said second power source.

1     6.     The RF amplification system of claim 1, wherein:  
2             said switch circuit includes a control amplifier to compare a voltage on said  
3     power node to a predetermined voltage level.

1     7.     The RF amplification system of claim 6, wherein:  
2             said switch circuit includes a switching device to controllably couple said power  
3     node to the first power source in response to an output signal of said control amplifier.

1     8.     The RF amplification system of claim 1, wherein:  
2             said regulator circuit includes a negative envelope detector to detect said  
3     negative envelope of said RF output signal on said output node of said power amplifier.

1     9.     The RF amplification system of claim 8, wherein:  
2             said regulator circuit includes a control amplifier to compare said negative  
3     envelope to said predetermined voltage level.

1     10.    The RF amplification system of claim 9, wherein:  
2             said regulator circuit includes a device to allow current flow from the second  
3     power source to the power node in response to an output signal of the control amplifier.

1     11.    The RF amplification system of claim 1, comprising:  
2             at least one first power source terminal to connect said RF amplification system  
3     to the first power source.

1     12.    The RF amplification system of claim 1, comprising:  
2             at least one second power source terminal to connect said RF amplification  
3     system to the second power source.

1 13. The RF amplification system of claim 1, further comprising:  
2 a capacitor connected between said power node and a common node, said  
3 capacitor having a relatively low impedance at RF frequencies of the RF output signal  
4 and a relatively high impedance at envelope frequencies of the RF output signal.

1 14. The RF amplification system of claim 1, further comprising:  
2 a second switch circuit to controllably couple said power node to a third power  
3 source having a third potential, wherein said third potential is different from said first  
4 said second potentials.

1 15. The RF amplification system of claim 1, wherein:  
2 said component having a relatively high impedance at RF frequencies of said RF  
3 output signal includes an inductor.

1 16. The RF amplification system of claim 1, wherein:  
2 said component having a relatively high impedance at RF frequencies of said RF  
3 output signal has a relatively low impedance at envelope frequencies of said RF output  
4 signal.

1 17. A method comprising:  
2 first coupling a power node of an RF amplifier to a first power source;  
3 monitoring a radio frequency (RF) signal at an output node of the RF amplifier;  
4 and  
5 second coupling the power node of the RF amplifier to a second power source,  
6 based on an envelope of said RF signal, to regulate a voltage level on the output node.

1 18. The method of claim 17, wherein:  
2 second coupling includes coupling the power node of the RF amplifier to the  
3 second power source when a negative envelop of the RF signal meets a predetermined  
4 criterion.

1 19. The method of claim 18, wherein:  
2 second coupling includes coupling the power node of the RF amplifier to the  
3 second power source when the negative envelop of the RF signal reaches a  
4 predetermined voltage level.

1 20. The method of claim 18, wherein:  
2 second coupling includes regulating a signal level on said output node of said  
3 RF amplifier so that said signal level does not fall substantially below a predetermined  
4 voltage level.

1 21. The method of claim 17, wherein:  
2 said first power source has a first potential and said second power source has a  
3 second potential, wherein said second potential is greater than said first potential.

1 22. The method of claim 17, further comprising:  
2 de-coupling the power node of the RF amplifier from the first power source  
3 after a voltage level on the power node has increased a predetermined amount as a  
4 result of said second coupling.

1 23. A wireless transmitter, comprising:  
2 a power amplifier having:  
3 an output node to carry an RF output signal; and  
4 a power node coupled to said output node through a component having a  
5 relatively high impedance at RF frequencies of said RF output signal;

6           an antenna to receive said RF output signal from said output node and to  
7   wirelessly transmit said RF output signal;  
8           a switch circuit to controllably couple said power node to a first power source  
9   having a first potential; and  
10          a regulator circuit to prevent a negative envelope of said RF output signal on  
11   said output node from going substantially below a predetermined voltage level during  
12   operation of said wireless transmitter by controllably coupling said power node to a  
13   second power source having a second potential in response to said negative envelope.

1   24.    The wireless transmitter of claim 23, wherein:  
2           said antenna includes a patch antenna element.

1   25.    The wireless transmitter of claim 23, wherein:  
2           said antenna includes a dipole antenna element.

1   26.    The wireless transmitter of claim 23, wherein:  
2           said regulator circuit includes a negative envelope detector to detect said  
3   negative envelope of said RF output signal on said output node of said power amplifier.

1   27.    The wireless transmitter of claim 26, wherein:  
2           said regulator circuit includes an control amplifier to compare said negative  
3   envelope to said predetermined voltage level.

1   28.    The wireless transmitter of claim 27, wherein:  
2           said regulator circuit includes a device to allow current to flow from the second  
3   power source to the power node in response to an output signal of the control amplifier.

1   29.    The wireless transmitter of claim 23, wherein:  
2           said component having a relatively high impedance at RF frequencies of said RF  
3   output signal includes an inductor.